

Appl. No. 09/981,789
Amtd. Dated July 2, 2003
Reply to Office action of April 2, 2003
Attorney Docket No. P13685/000500-319
EUS/J/P/03-1051

Amendments to the Specification:

Please replace the paragraph beginning at page 1, line 5, with the following rewritten paragraph:

AI
--In, for example, radio base stations for mobile telephony, cavity filters are normally used for a combiner between radio frequency transmitters and an antenna. Such a system is shown in US-6005452-A U.S. Patent No. 6,005,452 which is hereby incorporated as a reference.--

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Please replace the paragraph beginning at page 1, line 17, with the following rewritten paragraph:

-- US-6005452-A U.S. Patent No. 6,005,452 shows an insulator with integral input signal loop. This loop is inserted and attached in a cavity filter that is earthed and the loop is insulated from the cavity filter by means of the insulator. The distance between an end, that is not in contact with the insulator, and a hollow screw, can be adjusted, which means that the capacitance between the loop and the cavity filter can be adjusted. This adjustment means that, for example, the bandwidth of the radio frequencies that pass through the filter can be increased or decreased. The end is connected to an electrically conductive spindle which in turn is surrounded by a dielectric casing. This dielectric casing is connected to the wall of the cavity filter, which helps to fix the position of the loop in relation to the cavity filter.--

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Please replace the paragraph beginning at page 2, line 1, with the following rewritten paragraph:

AC
--Summary of the Invention--

Please replace the paragraph beginning at page 2, line 2, with the following rewritten paragraph:

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-- A general aim of the present invention is to achieve a device that allows a more simple design and fixing of a loop in a cavity filter for electromagnetic waves, while at the same time making possible simple changing of the capacitance between the loop and ~~an earthed~~ a grounded casing. Additional aims, effects and advantages will be apparent from the following description. The general aim of the present invention is achieved by a device for transmitting or receiving electromagnetic waves for a cavity, where the device comprises a loop and a dielectric part that houses at least a first end part of the loop, where the dielectric part defines a first recess designed to receive a means for setting the capacitance between the loop and a casing connected to earth, cavity housing and/or cover. A device is hereby achieved that only consists of one dielectric item with an embedded loop, for the transmission of signals to or from a cavity, while at the same time a means can easily be used to set the capacitance between the loop and the casing.--

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Please replace the paragraph beginning at page 3, line 14, with the following rewritten paragraph:

-- In addition, the second end part is essentially parallel to the first end part and at least one of them is milled in order to provide good fixing of the loop when it is embedded in the dielectric part. The dielectric part is designed to provide a particular impedance to the earthed grounded casing or cavity housing, together with the loop. In this way, a method can be used for adjusting, for example, the bandwidth of frequencies that pass through a cavity filter, where, for example, the bandwidth is only changed by changing the capacitance between earth and the loop. --

Please replace the paragraph beginning at page 6, line 15, with the following rewritten paragraph:

-- Figure 1 shows schematically an embodiment of a device 1 according to the invention in relation to a casing 2 for housing electrical and/or electronic components and a cavity 3 for electromagnetic waves. In this example, the cavity 3 can be seen to be a part of a cavity filter 4, such as a so-called ceramic filter for microwaves. The cavity 3 is defined by a cavity housing 5 and a cover 6, and as it is a cavity filter, a resonance device (not shown), such as a ceramic resonator and tuner, can be inserted in the cavity 3. The cover 6 is provided with an elongated hole 7 that fits a first part 8 of a dielectric part 9, designed among other things to fit in the hole 7, (see Figure 3). The dielectric part 9 is constructed of plastic, preferably polyetherimide, and constitutes an insulator between the cover 6 and a loop 10 comprised in the device 1, which loop is embedded in the dielectric part 9 at a first end part 11 (see Figure 3) with a first end 12 (see Figure 5)

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and a second end part 13, without covering a second end 14 (see Figure 3). For the introduction of microwaves into or removal of microwaves from the cavity 3, a conductor 15 is connected to the second end of the loop 10. The connection between the loop 10 and the conductor 15 can, for example, be carried out by soldering or a press fit, where the end of the conductor 15 comprises fingers that can open outwards radially. This is not shown, however, as the actual connection does not constitute a part of the invention. An expert within the field can design the connection in a suitable way. A second and a third part, 16 and 17 respectively, of the dielectric part 9 are inserted in a first and second opening, 18 and 19 respectively, in the casing 2. The first opening 18 is designed to receive the second part 16 and the second opening 19 is designed to receive the third part 17. As shown in Figure 1, the first and the second opening are together smaller than the elongated hole 7 in the cover. As the first part 8 essentially corresponds to the hole 7 in the cover 6, the first part 8 cannot be inserted in the casing 2, but serves as a stop element when the device 1 is inserted into the casing 2 from outside. A first and second flange, 20 and 21 respectively, integral with the casing 2, are situated inside the casing 2 at least partially around the periphery of the first and second openings 18, 19, respectively, in order to give the device 1 a larger contact surface with the casing 2 and thereby achieve reliable stability between the device 1 and the casing 2. The second flange 21, which is designed for the third part 17, is provided with a recess or a hole 22 passing through the second flange 21, for receiving a locking device 23 (see Figures 3-6 3, 4). The through-hole 22 and the locking device 23 are located at such a distance from the outer aperture of the second opening 19 that the locking device 23 enters completely into the through-hole 22 essentially at the same time as th

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first part 8 of the dielectric part 9 comes into contact with an outer surface 24 of the casing 2 when the device 1 is inserted into the casing 2. In this way, a locking effect is created between the device 1 and the casing 2, and it is not thereafter possible to move the device 1 relative to the casing 2. --

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Please replace the paragraph beginning at page 7, line 16, with the following rewritten paragraph:

-- The casing consists of two casing elements, of which a first casing element 25 is shown in Figure 1, while a second casing element 26 (see Figure 2) acts as a closing cover for the first casing element 25. Figure 2 shows almost the same view as Figure 1, but in Figure 2 the second casing element 26 has been fitted on to show a first threaded hole 27 and a second threaded hole 28. In order to fix the device 1 more securely, the third part 17 is provided with a fixing hole 29 (see Figures 3-6) to receive a fixing element, such as a screw (not shown). When the device 1 is secured in the casing 2 by the locking device 23 and the through-hole 22, the central axis of the fixing hole 29 is in line with the central axis of the first threaded hole 27, so that the fixing element can connect the second casing element 26 to the device 1. Of course, a threaded hole can be provided in the first casing element 25 instead of, or in combination with, the first threaded hole 27 in the second casing element 26. The second threaded hole 28 is designed to receive a means 30 in the form of a screw (see Figure 3) for setting the capacitance between the loop 10 and earth, by the casing being earthed directly or indirectly, via the cavity housing 5 and the cover 6, in a conventional way. --

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Please replace the paragraph beginning at page 7, line 31, with the following rewritten paragraph:

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-- The design of the first embodiment of the device will now be described in greater detail with reference to Figures 3-5. In addition to the first and second end parts, 11 and 13 respectively, the loop 10 comprises a central part 31, which is essentially at right angles in relation to the parallel end parts 11 and 13. The second end part 13 of the loop is designed together with the second part 16 to have a particular impedance to earth. The first end of the loop 12 (see Figure 1), that is the one on the first end part 11, is housed in the third part 17 of the dielectric part 9. A stamped essentially flat section in relation to the rest of the loop, is housed in the third part 17 and constitutes a part of the first end part 11. This flat section has an essentially flat first area 32 that is designed for a particular frequency. The flat area 32 has a perpendicular that points essentially at right angles to the main plane of the loop 10, so that it is turned towards the means 30 for setting the capacitance between the loop 10 and earth. Both the first end part 11 and the second end part 13 are milled to give these parts a surface that ensures that the loop 10 is fixed in the dielectric part 9.--

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Please replace the paragraph beginning at page 8, line 10, with the following rewritten paragraph:

-- As the first part 8 of the dielectric part is used as a stop element, the first part 8 has (see Figs. 3,4) an essentially flat contact surface 33 that is designed to make contact with the outer surface 24 of the casing so that further insertion of the device 1 into the casing 2 is prevented. The second part 16 of the dielectric part 9 extends essentially at right angles

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away from the contact surface 33. The second part 16 is designed as an elongated hollow rod with a cross-section that has an outer contour in the form of a cross, that is (see Figs. 3, 4)

✓ the cross-section comprises four radially-projecting projections 34, with adjacent projections 34 being displaced essentially 90° in the direction of the circumference. Of course, the second part 16 can have a different cross-section, such as one with a circular, elliptical or polygonal outer contour, provided that the second part 16 together with the second end part 13 is designed for a predetermined impedance. The second part 16 has a free end 35 on which the projection 34 is partially chamfered off in such a way that the cross-section of the second part 16 reduces gradually towards the free end 35. In this way, the insertion of the second part 16 into the first opening 18 in the casing 2 is made easier. The third part 17 of the dielectric part 9 is integral with and extends (see Figs. 3, 4)

✓ essentially at right angles out from the contact surface 33. The third part 17 is cast as a right block comprising among other things: the locking device 23 on an essentially flat (see Fig. 3) side 36 which faces towards the second part 16; a relatively large first recess 37 (see Figure 5) which is continuous; an elongated second recess 38 (see Figures 3, 5), which can be continuous and which extends essentially parallel with the first and second end parts of the loop 10; and an elongated third recess 39 (see Figures 3, 5), which can also be continuous and which extends essentially at right angles to the second recess 38. The first end part 11 of the loop 10 is embedded in the third part 17 in such a way that the first area 32 of the loop 10 is at least partially exposed in the first recess 37. The first recess 37 is preferably so large that there is relatively much dielectric in the form of air around the flat section. In order to provide reliable adjustable setting of the capacitance between the loop 10 and the casing 2 using the means 30, two opposing sections of the

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wall of the third part 17 that surrounds the first recess 37 are so designed that each of the sections defines two ribs 40 (see Figures 3, 5, 6) extending at least partially along the through direction of the first recess 37 and inwards towards the first end part 11 of the loop 10. These ribs 40 are preferably located symmetrically in relation to the flat section of the loop 10 and are sprung so that together they constitute a locking device for the means 30. In addition to the abovementioned fixing of the device 1 to the casing 2 by means of the fixing element and locking device, the ribs 40 make possible more accurate setting and fixing of the means 30 in relation to the loop 10. In the first recess 37 are also two stop pins 41 (see Figure 3) arranged essentially extending towards each other. These stop pins 41 are located essentially midway between each pair of ribs viewed in the direction of the first end part 11 of the loop 10, and located in front of the flat area 32 viewed in the direction of insertion of the means 30 towards the flat area 32. The two stop pins 41 prevent the means 30 from coming into contact with the loop 10. In addition, the stop pins 41 are designed to prevent galvanic contact between the means 30 and the loop 10. The locking device 23 is preferably an integral part of the third part 17. It consists of a sprung tongue with a sliding surface 42 (see Figures 5,6) which in the neutral position is angled in relation to the flat side 36 and a locking surface 43 (see Figure 5) that is angled in relation to the sliding surface 42. When the device 1 is inserted into the casing 2, the locking device 23 is first compressed against the flat side 36, but when the locking device 23 is pushed over a first aperture of the through-hole 22, the locking device 23 springs out again so that the locking surface 43 prevents the device 1 from being pulled out of the casing 2. At the locking device 23, the flat side has a little slot that means that the locking device 23 is pressed into the slot upon

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insertion before it is pushed over the through-hole 22, so that the sliding surface 42 is essentially parallel to the flat side 36. In order to be able to pull the device out again without using interfering force, the locking device 23 is compressed against the flat side 36 by means of a tool (not shown) that can be inserted into the second aperture of the through-hole 22...

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Please replace the paragraph beginning at page 10, line 4, with the following rewritten paragraph:

-- Figure 6 shows a second embodiment of the device 1. The dielectric part 9 is here provided with an essentially flat first surface 44 that constitutes a first bottom surface of the first recess 37. The first surface 44 has the same function as the stop pins 41 in the first embodiment, but the first surface 44 covers here the whole of the flat first area 32, (see Fig. 5) which is thus not shown in Figure 6. The second recess 38 is here also open towards the flat side 36 of the third part 17, so that a slot 45 is created from the flat side 36 to the second recess 38. As the second recess here is parallel to the flat side 36, some of the material between the second recess 38 and the flat side 36 forms a cantilevered sprung tongue 46, where the locking device 23 is located on the free end of the tongue 46. --